

# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

**DRAFT**

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Hatchery Program	Kalama River Spring Chinook
Species or Hatchery Stock	Chinook Salmon ( <i>Oncorhynchus tshawytscha</i> )
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Kalama Subbasin/Lower Columbia Province
Date Submitted	nya
Date Last Updated	August 16, 2004

## Section 1: General Program Description

### 1.1 Name of hatchery or program.

Kalama River Spring Chinook

### 1.2 Species and population (or stock) under propagation, and ESA status.

Chinook Salmon (*Oncorhynchus tshawytscha*)

ESA Status: Threatened

### 1.3 Responsible organization and individuals.

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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
National Marine Fisheries Service	Administrator of Mitchell Act Funds
Weyerhaeuser Company	MOA – Use of Gobar Pond

### 1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources	
Mitchell Act	
Operational Information	Number
Full time equivalent staff	6.0
Annual operating cost (dollars)	\$605,527

The above information for full-time equivalent staff and annual operating cost applies cumulatively to Kalama River Anadromous Fish Programs conducted at Kalama Falls and Fallert Hatcheries and cannot be broken out specifically by program.

### 1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Kalama River Spring Chinook
Broodstock collection location (stream, RKm, subbasin)	Kalama Falls Trapping Facility/Kalama River/RKm 16.1/Kalama Subbasin
Adult holding location (stream, RKm, subbasin)	Kalama Falls Hatchery//Kalama River/RKm 16.1/Kalama Subbasin
Spawning location (stream, RKm, subbasin)	Kalama Falls Hatchery/Kalama River/RKm 16.1/Kalama Subbasin
Incubation location (facility name, stream, RKm, subbasin)	Kalama Falls Hatchery/Kalama River/RKm 16.1/Kalama Subbasin
Rearing location (facility name, stream, RKm, subbasin)	Kalama Falls Hatchery/Kalama River/RKm 16.1/Kalama Subbasin; and Fallert Creek Hatchery/Kalama River/RKm 8.2/Kalama Subbasin

### 1.6 Type of program.

**Integrated Harvest** - The proposed integrated strategy for this program is based on WDFW's assessment of the genetic characteristics of the hatchery and local natural populations, the current and anticipated productivity of the habitat used by the populations, the potential for successfully implementing as isolated program, and NOAA's proposed listing determination (69 FR 33102; 6/14/2004). Modification of the proposed strategy may occur based upon NOAA's final listing determination and as additional information are collect and analyzed.

### 1.7 Purpose (Goal) of program.

- Plant 500,000 smolts at 10.0 ffp into the Kalama River (250,000 from Fallert Ck. Hatchery and 250,000 from Gobar Pond).
- The purpose is to mitigate Columbia River spring chinook production (predominately from hatcheries) which is a major contributor to the catches in Washington and Oregon ocean fisheries. Significant commercial net catch and recreational fishing occurs in the mainstem as well and minor catches in individual tributary streams.
- Incorporate a level of natural stock into the existing hatchery population to support overall ESU recovery goals.
- Operate hatcheries consistent with the recovery of spring chinook salmon in the Kalama River. The major hatchery issues are: 1) to maintain the genetic diversity of spring chinook in the Kalama River, and ensure the reproductive success of wild spring chinook meets or exceeds recovery goals, 2) minimize the ecological interactions of hatchery spring chinook on naturally produced salmon and steelhead, and minimize the mortality of naturally produced juvenile and adult salmon and steelhead due to facility operations.

### 1.8 Justification for the program.

- Legal justification includes: Columbia River Fisheries Development Program, Columbia River Fish Management Plan and *U.S.vs.Oregon* \_court agreements.
- WDFW protects listed fish and provides harvest opportunity on the Kalama River spring chinook programs through the Fish Management and Evaluation Plan (FMEP). The obiectives of the WDFW's FMEP are based on the WDFW Wild Salmonid Policv. In that

policy, it states that harvest rates will be managed so that 1) spawner abundance levels allow for abundant utilization of available habitat, 2) ensure the number and distribution of locally adapted spawning populations will not decrease, 3) genetic diversity within populations is maintained or increased, 4) natural ecosystem processes are maintained or restored, and 5) sustainable surplus production above levels needed for abundant utilization of habitat, local adaptation, genetic diversity, and ecosystem processes will be managed to support fishing opportunities (WDFW 1997).

In order to minimize impact on listed fish by WDFW facilities operation and the Kalama fall chinook program, the following Risk Aversion are included in this HGMP:

**Table 1.** Summary of risk aversion measures for the Kalama Spring Chinook program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Water rights are formalized thru trust water right #S2-14002 (Kalama Falls) and S2-*21721 (Fallert Creek Hatchery) from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	WDFW has requested funding for future scoping, design, and construction work of a new river intake system on Fallert Creek to meet NOAA compliance (Mitchell Act Intake and Screening Assessment 2002). A new intake structure at Kalama Falls is compliant. The Kalama Falls intake was rebuilt in 2001 and is in compliance.
Effluent Discharge	4.2	These facilities operate under the “Upland Fin-Fish Hatching and Rearing” National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) – WAG - 1039 (Kalama Falls) and WAG – 1053 (Fallert Creek Hatchery).
Broodstock Collection & Adult Passage	7.9	All fish are mass marked prior to release. Broodstock collection and sorting procedures can quickly identify listed non-target listed fish, and if encountered, released per protocol to minimize impact as determined by WDFW Region 5 staff.
Disease Transmission	7.9, 10.11	<i>Fish Health Policy in the Columbia Basin.</i> Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, <i>Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries</i> (Genetic Policy Chapter 5, IHOT 1995).
Competition & Predation	2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish. See also those sections.

## 1.9 List of program "Performance Standards".

See HGMP section 1.10.

## 1.10 List of program "Performance Indicators", designated by "benefits" and "risks".

### 1.10.1 Benefits:

Benefits		
Performance Standard	Performance Indicator	Monitoring & Evaluation
Assure that hatchery operations support Columbia River fish Mgt. Plan ( <i>US v Oregon</i> ), production and harvest objectives	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average of 0.17% smolt-to-adult survival that includes harvest plus escapement (850 fish at current production levels).	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program.  Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity	A minimum of 300 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return.	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983) Adhere to WDFW Stock Transfer guidelines. (WDFW 1991).
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use 100% mass-mark (adipose-fin clip) for selective fisheries with additional groups Ad+CWT (250,000) and CWT only for evaluation purposes.	Returning fish are sampled throughout their return for length, sex, mark and
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary  A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites.	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens and parasites.	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.	Control of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

**1.10.1 Risks:**

Risks		
Performance Standard	Performance Indicator	Monitoring & Evaluation
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (10 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. 100% mass mark production fish to identify them from naturally produced fish.	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, instream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented.
Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance  WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and instream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up to date information.

**1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).**

300 adults at 1:1 ration of female and males, excluding jacks.

**1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.**

250,000 yearlings at 10 FPP are released beginning mid-March from Gobar Pond (Tributary to the Kalama River at Rkm 32.2), and 250,000 yearlings at 10 FPP are released beginning mid-March from Fallert Creek Hatchery.

**1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.**

Data from Fallert Ck Releases			
Brood Year	SAR (%)	Return Year	Hatchery Escapement (Kalama Falls Data)
1990	0.47%	1990	1066
1991	0.05%	1991	1181
1992	NA	1992	1509
1993	0.12%	1993	1278
1994	0.06%	1994	629
1995	0.22%	1995	330
1996	0.15%	1996	188
1997	0.03%	1997	468
1998	0.08%	1998	364
1999		1999	757
2000		2000	988
2001		2001	834
2002		2002	1473
mean	0.17%		

**1.13 Date program started (years in operation), or is expected to start.**

Spring Chinook releases have occurred in this system since 1959.

**1.14 Expected duration of program.**

The program is on-going with no planned termination.

**1.15 Watersheds targeted by program.**

Kalama Subbasin/Lower Columbia Province

**1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.**

**1.16.1 Brief Overview of Key Issues:**

Spring chinook in the Kalama River are collected through the ladder at Kalama Falls Hatchery. They are reared at Kalama Falls Hatchery and at Fallert Creek Hatchery. The smolts that are reared at Kalama Falls Hatchery are trucked to Gobar Pond (upstream of Kalama Falls) for acclimation and release. The smolts that are reared at Fallert Creek Hatchery are released at that site.

**1.16.2 Potential Alternatives to the Current Program:**

Alternative 1: Modify release time or location, and/or reduce the size of the program. The primary ecological risks include competition, predation, and disease transfer between hatchery chinook and juvenile steelhead, cutthroat, coho, chum, and fall chinook.

**1.16.3 Potential Reforms and Investments:**

Reform/Investment 1: Address passage facilities at Kalama Falls. Fish passage at Kalama Falls is managed by the Kalama Falls fish barrier and fish ladder. This system is antiquated and needs

to be modernized into a sorting, moving, and loading system that will use water in the connivance of adult fish, and cause no harm to wild or hatchery fish. The fish barrier at KF has failed on one side and at this time is threatening the operation of the Kalama research team and may jeopardize many years of collection data for KF wild steelhead research. While we have design effort invested in the capture and fish transport system, funds for the barrier breach and the fish handling system need to be appropriated.

Reform/Investment 2: Provide adequate space and water. A solution may be in the large adult holding / rearing ponds. If the adult transport system incorporates better holding and sorting facilities in these ponds it will provide additional space and water to the ponds during the rearing cycle for spring chinook. Some investment into the methods and potential efficiencies needs to take place as well.

Reform/Investment 3: Adult sorting and handling in general is very hard on adult fish and routinely causes mortality that can be prevented with a modern sorting and handling system designed to cause the least harm possible to all fish handled. A semi-automated sorting system would be comprised of the following: An initial holding pond would collect and hold the fish until sorting is initiated by opening a gaiter, which allows adults to be attracted through a false weir and onto a fabricated, sloped, sorting chute. The chute contains paddles and side chutes. The side chutes lead to different adult ponds, and also provide returns to the river above and below the in stream barrier. An observer located in a control tower above the main chute identifies the fish as it enters the chute and then activities in of the paddles to direct the fish to the desired location. Staff does not physically handle the fish during this sorting process. Adults desired for spawning are directed into the adult ponds equipped with mechanical crowders and a spawning shed at the sippy end. There the adults can be held, crowded, sorted and spawned. Most adult ponds have a river return option as part of the sorting and piping associated with the ponds.

Reform/Investment 4: Monitoring and evaluation. Smolt trapping would provide estimates of natural production of spring chinook.

The hatchery program is a part of a strategy to meet conservation and/or harvest goals for the target stock. The tables below indicate what the short- and long-term goals are for the stock in terms of stock status (biological significance and viability), habitat and harvest. The letters in the table indicate High, Medium, or Low levels for the respective attributes. Changes in these levels from current status indicate expected outcomes for the hatchery program and other strategies (including habitat protection and restoration).

	Biological Significance	Viability	Habitat
Current Status	L	L	M
Short-term Goal	M	M	M
Long-term Goal	H	H	M

## Section 2: Program Effects on ESA-Listed Salmonid Populations

### 2.1 List all ESA permits or authorizations in hand for the hatchery program.

Program is described in “ Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service (March 99)”. WDFW is writing HGMP’s to cover all programs produced at Kalama Complex including; fall and spring Chinook, coho, summer and winter run steelhead.

#### 2.2.1 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur in the subbasin where the program fish are released:

ESA listed stock	Viability	Habitat
Fall Chinook	H	M
Spring Chinook	L	M
Summer Steelhead (Local)	M	M
Winter Steelhead (Local)	M	M
Coho- Natural and Hatchery (Proposed)	Na	Na
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

#### 2.2.2 Status of ESA-listed salmonid population(s) affected by the program.

Identify the ESA-listed population(s) that will be directly affected by the program.

**Lower Columbia River spring chinook salmon (*Onchorynchus tshawytscha*)** are federally listed as “threatened” under the Endangered Species Act.

Identify the ESA-listed population(s) that may be incidentally affected by the program.

**Lower Columbia River fall chinook salmon (*Oncorhynchus tshawytscha*)** are federally listed as “threatened” under the ESA on March 24, 1999.

**Lower Columbia River Steelhead (*Oncorhynchus mykiss*)**, were listed as threatened under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River.

**Lower Columbia River Coho (*Oncorhynchus kisutch*)** is currently a candidate for listing. (proposed as threatened on June 14, 2004.)

**Describe the status of the listed natural population (s) relative to “critical” and “viable” population thresholds.** Critical and Viable population thresholds have not been established for these ESUs and the populations within them. NMFS has formed a Lower Columbia River/Willamette River Technical Review Team (TRT) to review population status within the ESU and develop critical and viable population thresholds.

**Lower Columbia River fall chinook salmon (*Oncorhynchus tshawytscha*)** within the Evolutionary Significant Unit (ESU) are federally listed as “threatened” under the Endangered Species Act effective May 24, 1999.

**Status:** WDFW has submitted natural and hatchery draft management guidelines for Kalama fall chinook that will be used in the interim until the TRT recommendations are developed. In Washington, the LCR chinook ESU includes all naturally spawned chinook populations from the mouth of the Columbia River to the Cascade Crest. Native fall chinook have been reported in the Kalama, but a distinct stock no longer exists. The Kalama River fall chinook natural spawners are a mixed stock of composite production with a significant portion of the natural spawners hatchery produced fish. Kalama fall chinook are rated healthy because escapements have usually exceeded the escapement goal of 2,000 adults (SaSI 2002). Natural spawning abundance has exceeded 20,000 spawners, with spawning escapements from 1986-2001 ranging from 1,420 to 24,297 (average 6.287) but escapement levels have normally ranged from 2,000 to 4,000 since 1990. Although final escapement objectives have not been established by the NMFS through a recovery plan, WDFW has established draft interim minimum escapement objectives. The minimum fall chinook MSY escapement goal is 400 to 450 adult spawners passed above the weir (based on habitat between the weir and Kalama Falls Hatchery). Since some fish swim through the weir, this would lead to an escapement of 444 to 500 spawners in most years. In addition, there is a significant amount of spawning that occurs below the Modrow weir.

**Table 2.** Fall chinook salmon abundance estimates in the LCMA (FMEP 2003)

Year	Cowee- man River	Cowlitz River	Green River	Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washou- gal River	Wind River Bright	Wind River Tule
1990	241	2,698	123		20,54	342	17,506	2,062	177	11
1991	174	2,567	123	33	5,085	230	9,066	3,494	269	52
1992	424	2,489	150		3,593	202	6,307	2,164	51	54
1993	327	2,218	281	3	1,941	156	7,025	3,836	686	0
1994	525	2,512	516	0	2,020	395	9,939	3,625	1,101	11
1995	774	2,231	375	30	3,044	200	9,718	2,969	278	4
1996	2,148	1,602	667	351	10,630	167	14,166	2,821	58	166
1997	1,328	2,710	560		3,539	307	8,670	4,529	220	148
1998	144	2,108	1,287	66	4,318	104	5,929	2,971	953	202
1999	93	997	678	42	2,617	217	3,184	3,105	46	126
2000	126	2,700	852	27	1,420	323	9,820	2,088	25	14
2001	646	5,013	4,951	132	3,714	530	15,000	3,901	217	444
2002	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na

**Lower Columbia River spring chinook salmon (*Oncorhynchus tshawytscha*)** within the Evolutionary Significant Unit (ESU) are federally listed as “threatened” under the Endangered Species Act effective May 24, 1999. Reports of considerable historic numbers of spring chinook in the Kalama have not been verified and by the 1950s, only remnant (<100) spring chinook runs existed on the Kalama. Kalama spring chinook are a mixed stock with composite production and one of four spring chinook populations in the Columbia River Evolutionarily Significant Unit. Currently, natural spawning is concentrated on the mainstem Kalama between the Kalama Falls (RM 10.5) and Fallert Creek Hatcheries (RM 4.8). Spring chinook enter the Kalama River from March through July with wild spring chinook passed above Lower Kalama Falls with spawners having been observed up to upper Kalama Falls (RM 36.8). Kalama River spawning escapements from 1980-2001 ranged from 0 to 2,892 (average 444). Hatchery strays account for most spring chinook spawning in the Kalama River although integration of wild and hatchery adults above Kalama Falls can be monitored.

**Table 3.** Spring chinook salmon abundance estimates in the LCR (included hatchery and wild fish, FMEP 2003).

Year	Cowlitz	Kalama	Lewis	Wind
1990	320	34	1,419	173
1991	284	34	1,632	141
1992	279	168	1,328	248
1993	236	100	1,429	657
1994	167	408	478	50
1995	347	392	279	32
1996	36	272	504	425
1997	455	45	417	227
1998	356	46	213	60
1999	285	224	270	99
2000	266	34	439	216
2001	347	578	475	412
2002	Na	Na	Na	Na
2003	Na	Na	Na	Na

**Lower Columbia River Steelhead (*Oncorhynchus mykiss*)**, were listed as threatened under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River. Critical and Viable population thresholds have not been established by the Lower Columbia River/Willamette River Technical Review Team (TRT). Winter steelhead stock status is rated healthy in 2002 because this stock has maintained relatively stable escapement estimates within the normal range of variation (SaSI 2002). An escapement goal of 1,000 fish has been established for this native stock with wild production. Kalama summer steelhead are rated depressed based on a short-term severe decline in escapement from 1998 through 2001. The escapement goal for this stock is 1,000 adult spawners. Escapements in 1998 through 2001 have been only 14% to 33% of the goal. This is a native stock with wild production. Summer and winter steelhead have been observed spawning in the same area therefore runs are not always reproductively separate. Genetic sampling was conducted in 1994, however the collection (juveniles) may contain both summer and winter steelhead, so comparisons of this collection with other collections are not very informative and (Myers et al. 2002). An estimated 40% of returning naturally produced adults had at least one hatchery parent; however, wild stock has retained genetic traits of considerable adaptive value relative to the transplanted hatchery stock (Hulett and Leider 1989). Spawning occurs above Lower Kalama Falls in the mainstem and NF Kalama River and throughout many tributaries, including Gobar, Elk, Fossil, and Wild Horse Creeks with falls at RM 36.8 blocking upstream migration. WDW estimated potential summer and winter steelhead smolt production was 34,850; naturally-produced steelhead smolts migrating annually from 1978-1984 ranged from 11,175 to 46,659. Wild summer steelhead sport harvest in the Kalama River from 1977-1985 ranged from 5 to 2,978; since 1986 regulations limit harvest to hatchery fish. Summer hatchery steelhead are not produced in the Kalama but are transfers from Skamania and acclimated at Fallert Ck and released directly into the Kalama River.

**Table 4.** Wild summer steelhead abundance estimates in the LCMA

Brood Year	Pop Est Trap	Snorkel Surveys			Index/Redds
		Kalama	EF Lewis	Washougal	Wind
1990	745			156	116
1991	704			31	123
1992	1,075			77	129
1993	2,283			71	101
1994	1,041			49	104
1995	1,302			70	136
1996	614	85	44	96	
1997	598	93	57	106	106
1998	205	61	112	44	
1999	220	60	115	43	96
2000	140	99	118	26	
2001	329	117	145		
2002	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na

**Table 5.** Wild winter steelhead abundance estimates in the LCMA.

Brood Year	Index Redd Surveys					Pop. Est. Trap Counts		IndexTrap/redd
	Coweeman	SF Toutle	Green	EF Lewis	Washougal	NF Toutle	Kalama	Cedar Creek
1990	522	752	86	102		36	419	
1991		904	108	72	114	108	1,128	
1992		1,290	44	88	142	322	2,322	
1993	438	1,242	84	90	118	165	992	
1994	362	632	128	78	158	90	853	
1995	252	396	174	53	206	175	1,212	
1996	44	150				251	853	70
1997	108	388		192	92	183	537	78
1998	314	374	118	250	195	149	438	38
1999	126	562	72	276	294	129	562	52
2000	290	490	124	207	939	238	941	
2001	284	334	192	79	216	185	1085	
2002	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na

**Lower Columbia River Coho (*Oncorhynchus kisutch*)** is proposed as threatened on June 14, 2004.

**Status:** NMFS concludes that the LCR coho ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers. Twenty-one artificial propagation programs are considered to be part of the ESU as NMFS has determined that these artificially propagated stocks are genetically no more than moderately divergent from the natural populations (NMFS, 2004b). Late stock coho (or Type N) were historically produced in the Kalama basin with spawning occurring from late November into March. Early stock coho (or Type S) were historically produced in the Kalama basin with spawning occurring from October to mid November. Columbia River early and late stock coho produced from Washington

hatcheries are genetically similar. Kalama River wild coho run is a fraction of its historical size. An escapement survey in the late 1930s observed 1,422 coho in the Kalama River. In 1951, WDF estimated coho escapement to the basin was 3,000; both early and late coho were present. Hatchery production accounts for most coho returning to the Kalama River. Natural coho production is presumed to be very low. Electrofishing for juveniles in the Little Kalama River (a major tributary downstream of Kalama Falls) in 1994 and 1995 showed no coho but good numbers of steelhead. Coho have been planted in the Kalama basin since 1942; releases were increased substantially in 1967. The coho program at the two Kalama hatchery complexes was greatly reduced in recent years because of federal funding cuts; the remaining coho program is about 700,000 smolts released annually, split evenly between early stock (reared at Fallert Creek) and late stock (reared at Kalama Falls). (LCFRB Kalama Subbasin Report Volume II, Chapter 10).

### **2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.**

*Describe hatchery activities:* The following activities listed below are identified as general hatchery actions that are identified in the ESA Section 7 Consultation “Biological Opinion on Artificial Propagation in the Columbia River Basin” (March 29, 1999).

#### **Broodstock Program:**

*Broodstock Collection:* Program broodstock volitionally enter the trap at Kalama Falls beginning in April and lasting to September with peak arrival in May, June and July. Broodstock from representative portions of the run are held for maturation at Kalama Falls Hatchery. Portions of hatchery fish beyond broodstock needs are released upstream of the lower falls along with all wild (adipose present) spring chinook. Spawning from mature fish occurs over three weeks (September 6, 13 and 20<sup>th</sup>) in 2003. See Take Tables for direct take.

*Genetic introgression:* There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin. Lewis River (1996 and 1998) eggs were used only to supplement shortfalls in the program and have been the most recent inclusion of non-local stocks. Currently, only marked hatchery fish are used in the broodstock collection while marked and unmarked fish (76 males and 56 females in 2003) are released upstream. However, a plan for integrating this stock, using naturally produced adults (adipose present) is currently being developed and may be implemented in 2005. The hatchery contribution to natural spawning is believed to be up to 80% in some years and representative of the reference population. . In principle, the Kalama Falls Salmon Hatchery (KFH) will be operated to mimic the Kalama River natural spring chinook population. By agreeing to these principles, WDFW has acknowledged that there will be no selection for size, run timing, and spawning time in spring chinook retained for broodstock and that out of basin transfers into the hatchery will not occur except in extreme situations and only after consultation with the WDFW Regional Fish Program Manager. Indirect take from genetic introgression is unknown.

#### **Rearing Program:**

*Operation of Hatchery Facilities:* Facility operations at Kalama Falls and Fallert Ck. potential impacts include water withdrawal, hatchery effluent, and intake compliance. Monitoring and maintenance are conducted along with staff observations. Water intakes have engineered design criteria to minimize impingement of naturally produced fish on intake screens and the Mitchell Act Hatcheries Intake and Passage Study (April 2003) has assessed which structures are ESA compliant and forwarded needed improvements for funding at Fallert Ck. (See HGMP Sections

4.1 and 4.2) Indirect take from this operation is unknown.

*Disease:* Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at Kalama River Hatcheries. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) Chapter 5 have been instrumental in reducing disease outbreaks. Although pathogens occur in the wild and fish might be affected, they are believed to go undetected with predation quickly removing those fish. In addition, although pathogens may cause post release mortality in fish from hatcheries but there is little evidence that hatchery origin fish routinely infect natural populations of salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986; Stewart and Bjornn 1990; Foot et al. 2000 ). Prior to release, the health and condition of the chinook population is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release.

Indirect take from disease effects is unknown.

**Release:**

*Hatchery Production/Density-Dependent Effects:* The Kalama spring chinook release goals have remained constant at 500,000 since the early 1990's. In order to minimize density effects, fish are released from both hatchery sites over a period of ten days to two weeks. This strategy allows groups to emigrate and move from the area daily. Because Fallert Ck. is only 6.0 Rkm upstream of the confluence with the Columbia, many spring chinook smolts can vacate the Kalama system within the day they are released. For chinook moving downstream from Gobar pond (Rkm 32.2), outmigration may several days (see below). Indirect take from density dependent effects is unknown.

*Competition:* Salmon and steelhead feed actively during their downstream migration (Becker 1973; Muir and Emmelt 1988; Sager and Glova 1988) and if they do not migrate they can compete with wild fish. WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by the program described in this HGMP. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

- 1) The SIWG (1984) concluded that "migrant fish will likely be present for too short a period to compete with resident salmonids." Fish released on station release in large systems may travel even more rapidly – migration rates of approximately 20 river miles per day were observed by steelhead smolts in the Cowlitz River (Harza 1998).
- 2) NMFS (2002) noted that "...where interspecific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates."
- 3) Flagg et al. (2000) concluded, "By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource". Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids." Flagg et al (2000) also stated "It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine

environment.”

- 4) Fresh (1997) noted that “Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prey size) significantly changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra specific relationships may occur, it does not test mechanisms explaining why observed relations exist. Thus, competition and predation are usually one of several plausible hypotheses explaining observed results.”
- 5) Studies from Fuss (2000) on the Elochoman River and Riley (2004) on two Willapa Bay tributaries (Nemah and Forks Creek), indicate that hatchery reared coho and Chinook can effectively leave the watershed within days after release.

*Predation (Freshwater):* Chinook from this program could prey upon listed species of salmonids, but the magnitude of predation will depend upon the characteristic of the listed population of salmonids, the habitat in which the population occurs and the characteristics of the hatchery program (e.g., release time, location, number released and size upon release). The site specific nature of predation and the limited number of empirical studies that have been conducted, make it difficult to predict the predation effects of this specific hatchery release. WDFW is unaware of any studies that have been empirically estimated the predation risks to listed fish by this program.

**Predation Risk Factors:**

Environmental Characteristics: These characteristics can influence the level of predation (see SIWG (1984) for a review) with risk greatest in small systems during periods of low flow and high clarity. The Kalama system is a large river with annual flows ranging from a high of 4,500 cfs during the winter to a low of 300 cfs in late summer. During March, average flows of more than 1,500 cfs are available for dispersal and emigration although average flow can drop to approximately 500 cfs by the end of June (Wade 2002). Release of this hatchery program is consistent in a timeframe with adequate flows to help emigration and before lower water conditions result in greater risk.

Dates of Releases: The release date can influence the likelihood that listed species are encountered. There are limited studies on migration timing of naturally produced chinook but listed chinook from the Lower Columbia ESU are believed to emigrate over a wide window from March through August (LCFRB Technical Reports 2004). Spring Chinook releases are in early March and could vacate the system before listed fish emerge. Releases from the lower facility at Fallert Creek are low in the system and smolts would have little distance to travel to be dispersed in the Columbia mainstem.

Relative Body Size: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey upon fish up to 50% of their body length, most prey consumed is probably much smaller. Keeley and Grant (2001) suggest that the mean prey size for 100-200 mm fl salmonids is between 13-15% of predator body size. Salmonid predators were thought to be able to prey on fish up to approximately 1/3 of their length (USFWS 1994), although coho salmon have been

observed to consume juvenile chinook salmon of up to 46% of their total length in aquarium environments (Pearsons et al. 1998). Artic char are well known as piscivorous predators, but recent studies suggest the maximum prey size is approximately 47% of their length (Finstad et al. 2002). The “33% of body length” criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994; NMFS 2002)\*. WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the “33% of body length criterion” for listed species until further data for the Kalama system can be collected.

Release Location and Release Type: The likelihood of predation may also be affected by the location and the type of release. Other factors being equal, the risk of predation may increase with the length of time fish co-mingle. In the freshwater environment, this is likely to be affected by distribution of the listed species in the watershed, the location of the release and the speed at which fish released from the program migrate.

We have provided a summary of empirical information and a theoretical analysis of competition and predation interactions that may be relevant to the Kalama spring chinook program.

**Potential Kalama spring chinook predation and competition effects on listed salmonids:** The proposed annual production goal for this program is 500,000 fish with half released from the Gobar Creek Pond and from Fallert Ck. Fish at release average 10 FPP (155 mm fl) and are released in March. Potential prey would be no greater than 51 mm in length (33% of 155). The current date of release for Kalama spring chinook could allow for encounters of listed fish in the Kalama subbasin and Columbia mainstem.

**Releases from Fallert Ck:** Impact on wild chinook, coho and steelhead would be minimized because the release location is below the majority of all known spawning sites for these populations in the Kalama River.

**Releases from Gobar Ponds (Upper Kalama River):** The release date is in advance of the peak wild fall chinook and steelhead emergence in the ESU. Hatchery migrants would encounter wild spring chinook fry and fingerlings. Spring chinook fry emerge between November and March, depending on time of egg deposition and water temperature, and spend one full year in fresh water, and emigrate in their second spring as age-2 smolts. Falls chinook emergence is believed to start March and April and outmigration continues to late summer. Wild summer steelhead fry emerge from March through May; juveniles generally rear in fresh water for two years; emigration occurs from March to June, with peak migration from mid-April to mid-May. Winter steelhead spawning occurs from March to May with April 20<sup>th</sup> the peak week of spawning. Depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching which indicates wild winter steelhead fry would not be available until late May to mid June (LCSI Draft 1998). Additional data are presented below:

- Chinook fork lengths (fl) from the Lewis River system during the month of June indicate fish 48-55 mm fl (Columbia River Progress Report 2003-16). The Lewis River system fall chinook stock timing though is the latest for the Columbia tributary stocks, and considered to be the worst case scenario (smaller size) when compared to other Columbia River systems. Other examples are:

- Abernathy Creek (WRIA 25) indicated chinook lengths of 36mm – 40mm from March to April 1 (P.Hanratty, WDFW pers comm. 2004).
- Average chinook fork length by week from 26 sampling sites on the Kalama River by week indicate fish 44 mm fl (April 25), 46 mm fl (May 3), 56 mm fl (May 11) and 62 mm fl (May 16). Other lengths through August are available (Pettet WDFW 1990).
- Fork lengths from Cedar Creek (tributary to the N.F. Lewis River) indicate that average chinook lengths reach approximately 50 mm fl between the weeks of April 12 and April 19, 2004, and are growing rapidly with fish 55-60 mm fl by April 26 and May 3, 2004.

Actively migrating smolts would not likely interact with listed steelhead fry as spawning time for wild winter steelhead stocks in the ESU occurs from March to May with April 20<sup>th</sup> the peak week of spawning and depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching which indicates listed fish would not be present until late May to mid June (LCSI Draft 1998).

Indirect take from predation or competition is unknown.

**Table 6.** Steelhead Spawn and Emergence Windows.

Race	Spawn Time	Peak Spawn Window	Incubation to Hatch	Swim-up Window	Swim-up @ 50% Date	Source
Winter	March – May	April 15 - 25 <sup>th</sup>	May 13 – June 15	May 27- July 7	June 17	LCSI Draft 1998
Summer	February – April	March 20- 30 <sup>th</sup> .	April 14 – May 18	April 28 – June 2	May 15	Kalama Research Report 2003

There is potential for predation by hatchery spring chinook on naturally produced coho. Length data for wild coho in the Kalama basin is unknown. Depending on water temperatures, hatchery coho fry during the month of April can range from 42 – 40 mm fl, and 50mm fl by May 1 (Kalama Hatchery data 2001). Fish release from Fallert Ck are below most natural coho spawning areas. Spring chinook released from Gobar would not encounter any coho fry until they past Kalama Falls Hatchery (no adult coho are passed about Kalama Falls) and would leave the area of naturally spawning coho once they reach Fallert Ck., a distance of about 8.0 Km.

*Listed Coho (Proposed):*. Current lengths and data for proposed listed coho in the Elochoman basin are unknown. Depending on water temperatures, during the month of April, lower Columbia River hatchery coho fry can range from 42 – 40 mm fl, and 50mm fl by May 1 (LCR Hatchery data 2001). Indirect take from predation or competition is unknown.

*Residualism:* To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, volitional release strategies, size, and time guidelines.

- Condition factors, standard deviation and co-efficient of variation (CV) are measured through out the rearing cycle and at release.
- Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize out-of-size fish and programmed to produce smolt size fish at date of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.

- Releases occur within known time periods of species emigration from acclimated ponds.
- Releases from these ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating within days or a few weeks.
- Minimal residualism from WDFW chinook programs following these guidelines has been indicated from snorkeling studies on the Elochoman River (Fuss 2000) and on Nemah and Forks Ck. (Riley 2004). In extensive surveys conducted on the Lewis River, Hawkins and Tipping (1999) found no residualized hatchery spring chinook. Indirect take from residualism is unknown.

*Migration Corridor/Ocean:* It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once in the main stem, Witty et al. (1995) has concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. Evidence in estuarine and nearshore environments indicate that diets are often dominated by invertebrates with Durkin (1982) reporting that diet of coho smolts (128-138 mm fl) in the Columbia River estuary was composed almost entirely of invertebrates without evidence of salmonids as prey (HSRG - Hatchery Reform 2004). There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean. Indirect take in the migration corridor or ocean is unknown.

### **Monitoring:**

#### *Associated Monitoring Activities –*

The following monitoring activities are conducted in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon: redd surveys are conducted for winter steelhead in the SF Toutle, Coweeman, EF Lewis and Washougal rivers. Redd surveys are also conducted in the Cowlitz River for fall and spring chinook. Mark-recapture surveys provide data for summer steelhead populations in the Wind and Kalama rivers. Mark-recapture carcass surveys are conducted to estimate populations of chinook salmon in Grays, Elochoman, Coweeman, SF Toutle, Green, Kalama, NF Lewis, EF Lewis, rivers and Skamokawa, Mill, Abernathy, and Germany creeks and for all chum salmon populations. Snorkel surveys are conducted for summer steelhead in the EF Lewis, Washougal rivers. Adult trap Counts are conducted on the Cowlitz, NF Toutle, Kalama, and Wind rivers and on Cedar Creek a tributary of the NF Lewis River. Area-Under-the-Curve (AUC) surveys are conducted to collect population data for chum salmon in Grays River and Hardy and Hamilton Creeks. All sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation. Downstream migrant trapping occurs on the Cowlitz, Kalama, NF Lewis, and Wind rivers, Cedar Creek, and will expand to other basins as part of a salmonid life cycle monitoring program to estimate freshwater production and wild smolt to adult survival rates. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

#### **Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. (See Take Tables at the end of this document for

identified levels).

**Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.**

For listed species, any abnormal take observed, staff would inform WDFW District Biologist , Fish Health Specialist, or Area Habitat Biologist, who along with the Complex Manager would determine an appropriate plan and consult with NOAA for adaptive management review and protocol.

**Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.**

Take of chinook has been unknown, For steelhead see Kalama Wild winter and summer steelhead HGMPs. Listed spring chinook and listed coho (proposed) have been sorted and released upstream. No pond mortalities have been reported by staff.

## Section 3: Relationship of Program to Other Management Objectives

### 3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review Report and Recommendations - NPPC document 99-15*). Explain any proposed deviations from the plan or policies.

For ESU-wide hatchery plans, the production of spring chinook from Kalama Hatchery is consistent with:

- 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin
- 1999 Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin
- Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994)
- The *U.S. v. Oregon* Columbia River Fish Management Plan
- NWPPC Fish and Wildlife Program

For statewide hatchery plan and policies, hatchery programs in the Columbia system adhere to a number of guidelines, policies and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW Columbia hatchery operations with which the production of spring chinook salmon from Kalama Falls Hatchery is consistent with the following WDFW Policies:

*Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington.* These guidelines define practices that promote maintenance of genetic variability in propagated salmon. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

*Spawning Guidelines for Washington Department of Fisheries Hatcheries.* Assembled to complement the above genetics manual, these guidelines define spawning criteria to be used to maintain genetic variability within the hatchery populations. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).

*Stock Transfer Guidelines.* This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

*Fish Health Policy in the Columbia Basin.* Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Policy Chapter 5, IHOT 1995).

*National Pollutant Discharge Elimination System Permit Requirements* This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

### **3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.**

The program described in this HGMP is consistent with the following agreements and plans:

- The Columbia River Fish Management Plan
- U.S. vs. Oregon court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife Wild Salmonid Policy
- Lower Columbia Steelhead Conservation Initiative
- Weyerhaeuser Company MOA - Use of Gobar pond for spring chinook Acclimation Rearing and Release (1975)

### **3.3 Relationship to harvest objectives.**

#### **3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.**

Total annual harvest is dependent on management response to annual abundance in PSC (U.S./Canada), PFMC (U.S. ocean), and Columbia River Compact forums. WDFW also has received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the Fisheries Management and Evaluation Plan (FMEP), Columbia River Fish Management Plan (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process to ensure the harvest rates are consistent with recovery of the Lower Columbia river tule chinook population.

Lower Columbia chinook ESU consists of spring, fall tule, and fall bright fish runs. These runs are impacted differently by fisheries outside the LCMA and outside WDFW management. The sport fishery occurs from late February through July in the ten miles from the mouth upstream to the deadline below Kalama Falls Hatchery and is generally seven days per week. The harvest rate ranges from 1% to 72% of the total adult return (average is 31%). The harvest rate on natural fish is much less (no unmarked chinook can be retained until August 1). No tribal fishery occurs in the Kalama River. CWT recoveries show very little harvest of non-Kalama stock and no fish from above Bonneville Dam. Kalama spring chinook are harvested in ocean commercial and recreational fisheries from Oregon to Alaska, in addition to Columbia River commercial and sport fisheries. CWT data analysis of the 1989-1994 brood Fallert Creek indicates that 32% of the Kalama spring chinook were harvested and 68% escaped to spawn. Fishery recoveries of the 1989-1994 brood Kalama Hatchery spring chinook: Kalama sport (52%), British Columbia (17%), Alaska (10%), Washington Coast (9%), Columbia River (6%), and Oregon coast (6%) Mainstem Columbia River Harvest of Kalama spring chinook was very low after 1977 when April and May spring chinook seasons were eliminated to protect upper Columbia and Snake wild spring chinook. Mainstem Columbia harvest of Kalama River Hatchery spring chinook increased in 2001- 2002 when selective fisheries on adipose marked hatchery fish enabled mainstem spring fishing in April and May. Tributary harvest is managed to attain the Kalama hatchery adult broodstock escapement Goal.

Return Year	Adult Harvest
1995	55
1996	80
1997	48
1998	78
1999	342
2000	471
2001	717
2002	NA
2003	NA

### 3.4 Relationship to habitat protection and recovery strategies.

#### *Subbasin Planning and the Lower Columbia Fish Recovery Board (LCFRB)*

Kalama River HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Kalama River Subbasin Summary May 17, 2002) is a broad-scale initiative that will provide building blocks of recovery plans use by the Lower Columbia Fish Recovery Board (LCFRB) for listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, WDFW Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the LCFRB including the role of fish release programs originating from Kalama Complex. Staff is assessing the risks posed by the hatchery program using the Benefit-Risk Assessment Procedure (BRAP) in tandem with the LCFRB recovery plan.

#### *Habitat Treatment and Protection*

WDFW is presently conducting, or has conducted, habitat inventories within the Kalama River subbasin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP) which document barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

#### *Limiting Factors Analysis:*

A WRIA 27 (Kalama, North Fork Lewis River, and East Fork Lewis River Salmon) habitat limiting factors report (LFA) has been completed by the Washington State Conservation Commission (Wade G., March 2001) with the input of WDFW Region 5 staff. Approximately 96% of the Kalama watershed is in commercial forestry and owned by private companies. During the 1970's, almost the entire watershed, including the riparian zones, was logged, most of the instream LWD debris was removed, and an extensive system of roads was constructed. The resultant loss of riparian function and instream LWD, and the alterations in hydrology have left many subbasins with poor habitat conditions for salmonids. Reduced summer flows in recent years are likely the result of diminished glacial melt following the eruption of Mt. St. Helens.

### 3.5 Ecological interactions.

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program:* Kalama chinook smolts can be preyed upon through the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows (beginning at RM 4.0) and introduced spiny ravs along the Columbia mainstem sloughs can predate on coho

smolts as well as avian predators, including Caspian terns, gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Populations of mammals that can take a heavy toll on migrating smolts (river otters), and returning adults include: harbor seals, sea lions (increasing since the 1970's) and Orcas.

(2) *Salmonid and non-salmonid fishes or species that could be negatively impacted by the program:* Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run chinook salmon ESU (threatened); Snake River spring/summer-run chinook salmon ESU (threatened); Lower Columbia River chinook salmon ESU (threatened); Upper Columbia River spring-run chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted thru a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. See also Section 2.2.3 Predation and Competition.

(3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Multiple programs including spring chinook, Type S and N coho and steelhead programs are released in the Kalama system and limited natural production of chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.).

(4) *Salmonid and non-salmonid fishes or species that could be positively impacted by the program.* A host of freshwater and marine species that depend on salmonids as a nutrient and food base may be positively impacted by program fish. The hatchery program may be filling an ecological niche in the freshwater and marine ecosystem. A large number of species are known to utilize juvenile and adult salmon as a nutrient and food base (Groot and Margolis 1991; and McNeil and Himsworth 1980). Wild co-occurring salmonid populations might be benefited as hatchery fish migrate through an area. The migrating hatchery fish may overwhelm predator populations, providing a protective effect to the co-occurring wild populations. Pacific salmon carcasses are also important for nutrient input back to freshwater streams (Cederholm et al. 1999). Successful or non-successfully spawner adults originating from this program may provide a source of nutrients in oligotrophic coastal river systems and stimulate stream productivity. Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). The Kalama River drainage is thought to be inadequately seeded with anadromous fish carcasses and steelhead carcasses can be used throughout the basin. Assuming integrated spawning and carcass seeding efforts, approximately 1,000 – 5,000 fall Chinook adult carcasses could contribute approximately 10,000 – 50,000 pounds of marine derived nutrients to organisms in the Kalama river and a program has been initiated with the use of volunteers (Lower Columbia Fish Enhancement Group) to distribute Kalama Hatchery carcasses throughout the basin. *Saprolegniasis* occurrences in young hatchery fish have been observed in greater frequency on Mitchell Act stations that have nutrient enhancement projects and in some cases, circumstantial evidence suggests more outbreaks of gill and tail fungus are the result of nutrient enhancement efforts. Staff is continuing to monitor observations or occurrences of this possibility

## Section 4. Water Source

### **4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.**

At Kalama Falls hatchery, in the fall/winter of 2000/2001, a new intake pump station was constructed with FEMA monies after the flood 1996 damaged the facility. Five new pumps are capable of delivering approximately 16 cfs for rearing while two incubation pumps deliver 4 cfs for incubation. A settling pond for incubation water was recently completed. Additionally, there are two surface water gravity intakes on un-named creeks – one near the hatchery and one on the other side of the river and because of steep gradients have been determined by WDFW to be non-fish bearing.

At Fallert Creek, water can be gravity fed from the creek intake providing up to 10,000 gpm depending on weather and stream conditions. Pumps need to be used when dewatering becomes a concern late summer and early fall and the river intake is located adjacent to the hatchery with a four chambered pump system which can provide up to 5,000 gpm. Between the facilities, a total of 15,112 gpm is used (Montgomery Watson 1997).

Gobar Creek Acclimation and Release Pond uses water from an intake on Gobar Creek. Water is carried approximately 1000 ft via an 18 inch aluminum culver and is gravity fed. The intake is engineered to maintain a sufficient head for water flow. Approximately 7 cfs is available for use.

**4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.**

<b>Potential Hazard</b>	<b>Risk Aversion Measure</b>
Hatchery water withdrawal	Water rights total 26,031 gpm from October to June (Montgomery Watson 1997) and are formalized thru trust water right. Water rights are formalized thru trust water right #S2-14002 (Kalama Falls) and S2-*21721 (Fallert Creek Hatchery) from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. Water rights for 7 cfs is formalized thru trust water right S2-23782-c for use of Gobar Creek for fish rearing.
Intake/Screening Compliance	At Fallert Creek hatchery, both intake and screen criteria are not in compliance. WDFW has determined that fish passage upstream is necessary. From the assessment, significant changes are needed, WDFW has been requesting funding for future scoping, design, and construction work of a new intake system (The Mitchell Act Intake and Screening Assessment 2002). The Kalama Falls intake was rebuilt in 2001 and is in compliance. The Gobar Creek intake is designed to allow for over flow for downstream fish passage and debris transport, and upstream fish passage.
Hatchery effluent discharges. (Clean Water Act)	<p>These facilities operate under the “Upland Fin-Fish Hatching and Rearing” National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) – WAG -1039 (Kalama Falls) and WAG – 1053 (Fallert Creek Hatchery).</p> <p>The acclimation, rearing and release program from Gobar Pond does not exceed feed and production limits needed for NPDES permitting. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Adherence with the NPDES permit will likely lead to no adverse effects on water quality from the program on listed fish.</p> <p>Discharges from the cleaning treatment system are monitored as follows: <i>Total Suspended Solids (TSS)</i> C1 to 2 times per month on composite effluent, maximum effluent and influent samples. <i>Settleable Solids (SS)</i> C1 to 2 times per week on effluent and influent samples. <i>In-hatchery Water Temperature</i> - daily maximum and minimum readings.</p>

## Section 5. Facilities

### 5.1 Broodstock collection facilities (or methods).

A trap operates 365 days a year at the Kalama Falls Hatchery. Fish volitionally enter the trap via a step and pool ladder at Kalama Falls Hatchery. Once in the trap they are transferred via overhead brail into a 1,000 gallon tanker truck. Fish are then trucked a short distance (150 m) and are released into a sorting pond measuring 10' X 80' X 4'. Fish to be kept for broodstock are moved to a holding pond 4800 cu.ft with 250-300 gpm. Wild chinook are monitored and placed upstream. However, with integration of this program, an as yet undetermined number of wild chinook will be used for broodstock.

### 5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

Fish can be recycled downstream for additional harvest opportunities, by 1000 gallon tanker truck.

### 5.3 Broodstock holding and spawning facilities.

Approximately 300 adults are held in a 60 x 40 x 5 ft holding pond with approximately 800 gpm available for flow. Due to the length of holding time (up to 3-4 months and elevated temperatures (65 degrees F.) there can be significant mortality on adults. In 2003, 174 out of 468 adults were lost, but an average of 10-20% is more representative.

### 5.4 Incubation facilities. Eggs are incubated at Kalama Falls Hatchery.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading- Hatching (eggs/unit)
Heath Vertical Stacked Tray Units (14 trays/stack)	6	5	nya	6000	6000

## 5.5 Rearing facilities.

Rearing occurs at both locations:

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
4	Standard Concrete Raceways- Kalama Falls Hatchery	4800	80	20	3.0	500	nya	0.5
1	Acclimation Pond- Gobar Satellite Facility	430000	nya	nya	nya	2600	nya	0.5
4	Standard Concrete Raceways- Fallert Creek Hatchery	4800	80	20	3.0	500	nya	0.5
1	Earthen Pond with Concrete Sides- Fallert Creek Hatchery	48600	144	75	4.5	2600	nya	0.5

## 5.6 Acclimation/release facilities.

Same, see above.

## 5.7 Describe operational difficulties or disasters that led to significant fish mortality.

Adult holding through the summer can result in significant (30%) mortality. Both oxytetracycline and florfenicol have been used to control *Furunculosis*.

**5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.**

- All pumps, broodstock holding, incubation and rearing receptacles have water loss alarms.
- Staff is available 24/7 to respond to pump failure, water loss, and flooding events.
- Aeration pumps are used to maximize the water conditions in the adult collection pond during periods of low water quality which benefits fish held until sorting can be accomplished.
- Fish health protocols through broodstock collection, incubation and rearing phases are followed and monitored monthly.
- Broodstock collection is checked daily for program and listed fish.
- Staff monitors the trap operation daily to keep the numbers of fish stacking in the trap area to manageable volumes. Heavy volumes can create density problems for listed fish if they are not removed expeditiously.

## Section 6. Broodstock Origin and Identity

### 6.1 Source.

The broodstock is derive from stock collected at the Kalama Falls trap/weir (100% collection rate at structure). All adults for use as broodstock have been recruited from Kalama Subbasin returning adults over the past five years..

#### 6.2.1 History.

Spring and fall chinook are indigenous to the Kalama system. By the early 1900s, Columbia River salmon populations were declining from over fishing and a combination of land use practices that proved detrimental to salmon habitat (WDFW, 1998 vol. 1). Early attempts to save the native population through hatchery production failed, and by the 1950s spring chinook runs in the Kalama River had been reduced to only remnant populations. Hatchery programs for spring chinook were established at Kalama Falls Hatchery after its completion in 1959. The Kalama River naturally spawning spring chinook population was considered healthy based on escapement trend (see Table 3, above) (WDF/WDW 1993). However, this status was determined on a mixed stock of composite production, and WDFW is not sure of the recent status of wild Kalama spring chinook populations (Rawding 1999). Escapement from 1980-1991 averaged 602 with a low of zero in 1985 and a peak of 2,892 in 1982 (WDF/WDW 1993). Primary production is from hatchery releases. Spawning occurs between the Lower Kalama Hatchery (RM 4.8) and the Kalama Falls Hatchery (RM 10). In recent years, adults have been released upstream of the upper hatchery, allowing access all the way to the upper falls (RM 36) (Caldwell et al. 1999).

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Kalama River Spring Chinook	H	U	Present
Lewis River Spring Chinook	H	U	1998
Miscellaneous Lower Columbia River Spring Chinook	H	U	U

#### 6.2.2 Annual size.

The run size to the Kalama Subbasin (hatchery plus spawning grounds) has ranged between 460-1391 over the period of 1996 through 2000. (Average = 759). WDFW has established an egg take goal of 590,000 eggs in the Future Brood Document (FBD). To meet this goal a total of 150 females and 150 males need to be collected annually, based on an average fecundity of 4400 eggs/female and pre-spawning mortality of 10%.

#### 6.2.3 Past and proposed level of natural fish in the broodstock.

Currently, only marked fish are used in broodstock collection. However, a plan for integrating this stock, using naturally produced adults (adipose present) is currently being developed and may be implemented in 2005.

#### **6.2.4 Genetic or ecological differences.**

Starting in 2002, wild spring Chinook and hatchery fish (adipose fin-clip) could be identified. Before 2002, broodstock was integrated at an unknown level. Because of this there are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.

#### **6.2.5 Reasons for choosing.**

The stock has a run entry pattern and timing that provides harvest opportunities for fisheries in Kalama subbasin, the lower Columbia mainstem/tributaries, Washington/Oregon Coast. It is also representative of the current Kalama Spring Chinook genetic stock including natural spawners.

#### **6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.**

- Every effort shall be made to promote local adaptation of this spring Chinook population and out of basin hatchery transfers of eggs or fish for use of broodstock will only be considered in extreme cases.
- Integrating natural spawners will represent the existing spring chinook run through out the season.
- Hatchery program fish are mass marked.
- However, a plan for integrating this stock, using naturally produced adults (adipose present) is currently being developed and may be implemented in 2005.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish will be released immediately if encountered during the broodstock selection process.

## Section 7. Broodstock Collection

### 7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adults for broodstock.

### 7.2 Collection or sampling design

Adults arrive in early April and peak in May, June and July. Representative broodstock are held on station through the summer until maturation in September.

Proposed Integration – Starting with 2005 brood, WDFW will integrate natural spring chinook into the broodstock at a yet to be determined level.

### 7.3 Identity.

Spring chinook are identified by run timing (separation from falls) Fish arriving at Kalama Falls from April to July have entered the river before the temporary weir below Modrow Bridge is installed separating the spring run from the fall component. In past years, only 25% of the fish were identifiable as hatchery origin fish, so an unknown portion of wild fish were integrated within the broodstock operation. Presently, 100% of the returning hatchery origin fish have visibly identifiable marks.

### 7.4 Proposed number to be collected:

#### 7.4.1 Program goal (assuming 1:1 sex ratio for adults):

As mortality on adults can be significant, up to 400 adults could be retained to make sure that 300 cohorts (150 males and 150 females) are available, not including jacks.

#### 7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Year	Adults		
	Females	Males	Jacks
Planned	150	150	6
1993	334	330	2
1994	198	117	1
1995	164	68	0
1996	46	44	0
1997	145	136	3
1998	55	78	2
1999	149	160	3
2000	148	150	1
2001	147	154	4
2002	Na	Na	Na
2003	149	145	1

### **7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.**

Natural spring Chinook and up to 500 hatchery spring Chinook are placed upstream of the Kalama Falls hatchery as part of an evaluation effort to contribute to spawning and nutrient enrichment in the upper watershed. In 2003 this included 987 males and 968 females. Excess fish past this carrying capacity can be recycled downstream.

### **7.6 Fish transportation and holding methods.**

Fish are transferred a short distance (100m) from the trap to the sorting pond in a 1000 gallon tanker. Broodstock up to 400 fish are held in one pond with partial cover and freshwater supply (non-reuse).

### **7.7 Describe fish health maintenance and sanitation procedures applied.**

All fish held for spawning are treated with formalin at 1:6000 for fungus 6 days a week. Hydrogen peroxide is used for parasite (copepod) control. Early arrivals are inoculated with oxytetracycline for *Furunculosis* control at a rate of 0.5cc/10lbs of fish. To deal with adult mortality, two years of experiments with florfenicol was used to treat *Furunculosis* but now the staff is currently using oxytetracycline. Inoculations (liquamycin) for *bacterial kidney disease (BKD)* are used. Adults are sampled for viruses and BKD using the ELISA technique. The adult holding area is separated from all other hatchery operations. All equipment and personnel use disinfection (chlorine) procedures upon entering or exiting the area. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning. Spawning implements are rinsed with an iodophor solution, and spawning area and implements are disinfected with iodophor solution at the days end of spawning.

### **7.8 Disposition of carcasses.**

Carcasses are disposed of at a landfill (due to inoculation).

### **7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.**

- Every effort shall be made to promote local adaptation of this spring chinook population and out of basin hatchery transfers of eggs or fish for use of broodstock will only be considered in extreme cases.
- Integrating natural spawners will represent the existing spring chinook run through out the season.
- Hatchery program fish are mass marked.
- A plan for integrating this stock, using naturally produced adults (adipose present) is currently being developed and may be implemented in 2005.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish will be released immediately if encountered during the broodstock selection process.

## **Section 8. Mating**

### **8.1 Selection method.**

Cohorts are utilized from the entire run cycle with males and females available on a given day mated randomly. Spawning is conducted weekly with eggs being grouped from earlier mature fish and later mature fish although this separation can be only a period of one to two weeks. Fish are spawned throughout September to represent the entire spawn-timing for the stock. Program eggs are maintained in two groups (early eggtake and late eggtake), and all eggs are incubated from green to eyed egg stage at the Kalama Falls Hatchery.

### **8.2 Males.**

Up to 2% jacks can be incorporated. In 2002 this ratio was 0.8%.

### **8.3 Fertilization.**

Over all ratio of 1:1 is applied. For daily egg takes, eggs from five females are spawned into a bucket (ovarian fluid is not drained), and the sperm from five males are then combined with the eggs.

### **8.4 Cryopreserved gametes.**

Cryopreserved gametes are not used.

### **8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.**

- Every effort shall be made to promote local adaptation of this spring Chinook population and out of basin hatchery transfers of eggs or fish for use of broodstock will only be considered in extreme cases.
- Listed spring chinook will be collected through out the run time from adults arriving at the hatchery rack.
- Mating cohorts are randomly selected
- Protocols for population size, fish health disinfection and genetic guidelines followed.

## Section 9. Incubation and Rearing.

### 9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Performance Std.	Fry-fingerling Survival (%)	Rearing Survival Performance Std.	Fingerling-Smolt Survival (%)
1993	1319700	55.3	nya	nya	nya	nya	nya
1994	799100	86.0	nya	nya	nya	nya	nya
1995	527300	83.0	nya	nya	nya	nya	nya
1996	111700	62.0	nya	nya	nya	nya	nya
1997	589800	93.0	nya	nya	nya	nya	73.0
1998	590672	96.0	nya	nya	nya	nya	98.0
1999	630652	96.0	nya	nya	nya	nya	nya
2000	584600	94.0	nya	nya	nya	nya	nya
2001	609151	nya	nya	nya	nya	nya	nya

### 9.1.2 Cause for, and disposition of surplus egg takes.

Egg takes are planned according to data/information of historical egg takes at the Kalama Complex. Thus, egg takes are maintained within the plus/minus 5% guideline of the Section 7 permit. BKD and viral sampling lots (60 fish lots) are conducted over the course of the season. Lots are removed for unacceptable levels of BKD and with any other protocols involved due to viral sampling results. Otherwise, the program broodstock collection goal set forth in the annual brood document usually prevents surpluses.

### 9.1.3 Loading densities applied during incubation.

Eggs are loaded at 6,000 eggs per tray with 5 gpm flow. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time. See section 5.4 for load and hatching criteria. Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities.

### 9.1.4 Incubation conditions.

Egg takes are separated by an earlier component grouped by early September takes and a later September grouping. Both takes are incubated and hatched at Kalama Falls. Eggs were water hardened with iodophor. Incubation water is river water. Eggs can be treated with iodophor and parsite-s until eggs are ready to be shocked and picked.

### 9.1.5 Ponding.

Fry are ponded when: a visual inspection of the amount of yolk sac remaining with the yolk slit closed to approximately 1 millimeter wide (approximately 1600 TU's) or based on (95% yolk absorption) KD factor. At this time fry are transferred to the appropriate starter raceway (See HGMP Section 5.5 for raceway specifications). Ponding takes place in mid December through early January (2003). A total of three egg takes are split into two ponds for density and start up

feeding. By late spring and early summer (May/June) 50% of the spring Chinook production is transferred to Fallert Ck at 100 – 125 FPP. Production at Kalama Falls is transferred to Gobar Pond during late fall (November).

### 9.1.6 Fish health maintenance and monitoring.

Spring Chinook receive formalin treatments for fungus control through the summer and two prophylactic treatments for *bacterial kidney disease (BKD)*. The 1<sup>st</sup> treatment is normally 14 days with the 2<sup>nd</sup> treatment 28 days duration.

### 9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

- IHOT and WDFW fish health guidelines followed.
- Multiple units are used in incubators.
- Splash curtains can isolate incubators.
- Temperature, dissolved oxygen, and flow are monitored.
- Dead eggs are discarded in a manner that prevents transmission.

### 9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Performance Std.	Fry-fingerling Survival (%)	Rearing Survival Performance Std.	Fingerling-Smolt Survival (%)
1993	1319700	55.3	nya	nya	nya	nya	nya
1994	799100	86.0	nya	nya	nya	nya	nya
1995	527300	83.0	nya	nya	nya	nya	nya
1996	111700	62.0	nya	nya	nya	nya	nya
1997	589800	93.0	nya	nya	nya	nya	73.0
1998	590672	96.0	nya	nya	nya	nya	98.0
1999	630652	96.0	nya	nya	nya	nya	nya
2000	584600	94.0	nya	nya	nya	nya	nya
2001	609151	nya	nya	nya	nya	nya	nya

### 9.2.2 Density and loading criteria (goals and actual levels).

The juvenile rearing density and loading guidelines used at the facility are based on: standardized agency guidelines, life-stage specific survival studies conducted at other facilities and staff experience (e.g. trial and error). IHOT standards are followed for: water quality , alarm systems, predator control measures to provide the necessary security for the cultured stock , loading and density. In all facilities within Kalama Complex, densities are kept at or below 3.3 lbs /gpm and 0.5 lbs /cu ft. before the last loading reduction in the fall of the year. Trough maximum loading is 40 lbs at 12 gpm (3.33 lbs/gpm). Tank and raceway maximum loading for early rearing is 132 lbs for the tanks at 40 gpm (3.3 lbs/gpm) and 800 lbs per raceway at 300 gpm. (2.66 lbs/gpm). The final loading per raceway is approximately 3200 lbs. at 300 gpm (10.6 lbs/gpm).

### 9.2.3 Fish rearing conditions.

Environmental parameters: flow rates, water temperatures, dissolved oxygen and Total Settable Solids (TSS) are monitored on a routine basis thru the rearing period. All ponds are broom cleaned as needed and pressure washed between broods. We use demand feeders on all raceways throughout the fall and winter months. Kalama Falls Hatchery Production Group- 1/2 of the program production (250000 fish) are retained and reared until early December at the Kalama Falls Hatchery. Fish are transferred (after marking) from the Kalama Falls Hatchery to Gobar Satellite Facility for final rearing/acclimation. Fish are reared/acclimated from early December to early March. Yearling smolts are allowed to volitionally migrate from the Gobar acclimation pond at ~10 fpp during first week of March.

### 9.2.4 Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
December 2001	42.0	858	1.171	nya	nya	nya
January 2002	43.9	690	0.962	0.196	nya	nya
February 2002	50.9	445	1.002	0.292	nya	nya
March 2002	57.1	315	1.062	0.413	nya	nya
April 2002	67.1	195	1.066	0.381	nya	nya
May 2002	70.5	150	1.081	0.231	nya	nya
June 2002	77.9	110	1.067	0.267	nya	nya
July 2002	85.5	83	1.110	0.245	nya	nya
August 2002	108.2	41	1.163	0.506	nya	nya
September 2002	124.4	27	1.970	0.341	nya	nya
October 2002	135.2	21	1.201	0.222	nya	nya
November 2002	154.8	14	1.298	0.333	nya	nya
December 2002	162.5	12	1.299	0.143		
January 2003	162.9	12	1.311	0.000		
February 2003	141.2	11.7	1.382	0.0025		

### 9.2.5 Indicate monthly fish growth rate and energy reserve data (average program performance), if available.

Same, see section 9.2.5 above.

**9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).**

Feed rate is applied in accordance with program goals not to exceed 0.1-0.15 pounds feed per gallon inflow depending on fish size. Average season conversion rates generally are no greater than 1.3:1.0

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
1700-525 fpp	Moore Clark Nutra 0	nya	1.5-0.75	nya	nya
525-275 fpp	Moore Clark Nutra 1	nya	1.5-0.75	nya	nya
275-125 fpp	Moore Clark Nutra 2	nya	1.75-2.0	nya	nya
125-80	Moore Clark Nutra Fry 1.2	nya	1.75-2.0	nya	nya
80-40 fpp	Moore Clark Nutra Fry 1.5	nya	1.75-2.0	nya	nya
40-15 fpp	Moore Clark Nutra Fry 2.0	nya	1.3-1.5	nya	nya

### 9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

Fish Health Monitoring	Policy guidance includes: <i>Fish Health Policy in the Columbia Basin</i> . Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, <i>Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries</i> (Genetic Policy Chapter 5, IHOT 1995). A Fish Health specialist inspects fish programs at Kalama Complex monthly and checks both healthy and if present symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Erythromycin treatments four times during the rearing period was needed. Saprolegniasis occurrences in young hatchery fish have been observed in greater frequency on Mitchell Act stations having nutrient enhancement projects. In some cases, circumstantial evidence suggests more outbreaks of gill and tail fungus are the result of nutrient enhancement efforts as well. Staff is continuing to monitor observations or occurrences of this possibility. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file.
Sanitation	All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

### 9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

The migratory state of the release population is noticeable by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, leaner condition factors, a more silvery physical appearance and loose scales during feeding events are signs of smolt development that can be observed by staff. Multiple smolt events can also be triggered by environmental cues including daylight increase, a spike in the water temperature and spring freshets. ATPase activity is not measured.

### 9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

None used.

**9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.**

- Every effort shall be made to promote local adaptation of this spring Chinook population and out of basin hatchery transfers of eggs or fish for use of broodstock will only be considered in extreme cases.
- Integrating natural spawners will represent the existing spring chinook run through out the season.
- Hatchery program fish are mass marked.
- However, a plan for integrating this stock, using naturally produced adults (adipose present) is currently being developed and may be implemented in 2005.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish will be released immediately if encountered during the broodstock selection process.

## Section 10. Release

### 10.1 Proposed fish release levels.

Kalama Falls Hatchery Production Group- 1/2 of the program production (250000 fish) are retained and reared until early December at the Kalama Falls Hatchery. Fish are transferred (after marking) from the Kalama Falls Hatchery to Gobar Satellite Facility for final rearing/acclimation. Fish are reared/acclimated from early December to early March. Yearling smolts are forced from the Gobar acclimation pond at ~10 fpp during first week of March. 250,000 fish at 10.0 FPP are released from Gobar Pond to Gobar Creek (Tributary to the Kalama River at Rkm 32.2) in early to mid March.

Fallert Ck. Hatchery Production Group- 1/2 of the program production (250000 fish) are transferred from Kalama Falls Hatchery to the Fallert Creek Hatchery for late rearing, acclimation, and release. Fish are reared/acclimated and volitionally released from the Fallert Creek rearing/acclimation units at ~ 10 fpp, over a two week period in early-mid March. 250,000 fish at 10.0 FPP are released from Fallert Creek hatchery into the Kalama River at Rkm 6.0.

### 10.2 Specific location(s) of proposed release(s).

Same, see section 10.1 above.

### 10.3 Actual numbers and sizes of fish released by age class through the program.

Release Year	Yearling Release		
	No.	Date (MM/DD)	Avg Size (fpp)
1995	542500	May	5.8
1996	463600	March	6.2
1997	377736	March and April	5.0
1998	106996	March	7.0
1999	398000	March	6.5
2000	515408	March	6.0
2001	500886	March	9.7
2002	425234*	March	9.4
2003	461087*	March	11.0

\* In 2002 and 2003, a number of different sizes were released. A size study on survival is being conducted.

### 10.4 Actual dates of release and description of release protocols.

Fish at Fallert Ck. are the later spawner grouping and are volitionally released from the facility over a two week period beginning in early March. This period lies within the outmigration window of naturally produced fish. In 2003, dates of releases were from March 3 thru the 24<sup>th</sup>.

Fish from Gobar Ponds are earlier from spawner grouping and are initially allowed to

volitionally outmigrate, followed shortly by force-released, from the Gobar Acclimation Satellite in early-mid March. This period lies within the outmigration window of naturally produced fish. In 2003 date of releases were March 3 to the 5<sup>th</sup>.

#### **10.5 Fish transportation procedures, if applicable.**

Fish from Kalama Falls are transported via 1000 gallon tanker with 5% salt (Sodium chloride) solution to Fallert Ck. or to Gobar Ponds. Normal transit time is approximately 20 minutes.

#### **10.6 Acclimation procedures (*methods applied and length of time*).**

Early Egg take Group- Kalama Falls Hatchery: Fish are transferred (after marking) from the Kalama Falls Hatchery to Gobar Satellite Facility for final rearing/acclimation. Fish are reared/acclimated from early December to early March. Yearling smolts are forced from the Gobar acclimation pond at ~10 fpp during first week of March. Water source is Gobar Creek and the Kalama River.

Late Eggtake Group- Fallert Creek Hatchery: Fallert Creek Hatchery Production Group- are transferred from Kalama Falls Hatchery to the Fallert Creek Hatchery for final rearing and release. Fish are reared/acclimated and volitionally released from the Fallert Creek rearing/acclimation units at ~ 10 fpp, over a two week period in early-mid March. Water source is Fallert Creek.

#### **10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.**

Starting in 2000, 50% of the fish have been CWT/Ad Clipped and 50% have been AD Clipped.

#### **10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.**

Egg takes are planned according to data/information of historical egg takes at the Elochoman Hatchery. Thus, egg take and production are maintained within the plus/minus 5% guideline. For unforeseen events, the Hatchery Manager would contact the Complex Manager who would contact the appropriate WDFW Regional Manager to apprise him/her of the situation. Regional Manager would consult with appropriate regional co-managers/NOAA to get recommendation for fish disposition. The Hatchery Complex Manager would instruct hatchery to implement recommendation. .

#### **10.9 Fish health certification procedures applied pre-release.**

Whenever abnormal behavior or mortality is observed, staff conducts the Area Fish Health Specialist. The fish health specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy. All fish are examined for general condition and health as well as presence of “reportable pathogens” as defined in the PNFHPC disease control guidelines, within 1 to 3 weeks prior to release.

#### **10.10 Emergency release procedures in response to flooding or water system failure.**

In the event of a water system failure, screens would be pulled to allow fish to exit the ponds or in some cases they can be transferred into other rearing vessels to prevent an emergency release. WDFW also has emergency response procedures for providing back-up pumps, transport trucks, etc. in cases of emergency. In cases of severe flooding the screens are not pulled because flood waters rise to the point where they breach the ponds. Past experience has shown that the fish tend to lay on the bottom of the pond during flooding events and only those that are

inadvertently swept out are able to leave. Every effort will be made to avoid pre-programmed releases including transfer to alternate facilities. Emergency releases, if necessary and authorized, would be managed by removal of outlet screens and pull sumps of the rearing units. If possible, staff would set up portable pumps to use river water to flush the fish.

**10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.**

- Volitional on-site releases occur during March. Release strategies are to ensure that hatchery fish migrate from the hatchery/release site with a minimal amount of interaction with native fish populations.
- The production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal rearing of delay in the rivers, limiting interactions with naturally produced steelhead juveniles.
- WDFW uses acclimation and release of smolts in lower river reaches where possible, this in an area below known wild fish spawning and rearing habitat. Fry releases in 1997 (223,800) and 1998 (784,365) have been discontinued to reduce competition on listed fry
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to assess, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Kalama River Hatchery programs are communicated to Region 5 staff for any risk management or needed treatment. See also section 9.7.

## **Section 11. Monitoring and Evaluation of Performance Indicators**

### **11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.**

Performance indicators for the hatchery program includes broodstock escapement and associated egg take, rearing and release data. Performance indicators for fisheries typically include estimates for the catch, catch rates, harvest, harvest rates, hooking mortality for fish caught and released, effort of the fishery, and catch per unit effort (CPUE) for the fishery. WDFW makes statistically based estimates of hatchery steelhead and salmon catch from the WDFW catch record card (CRC) and follow-up phone surveys. In conjunction with CRC estimates, these can be used to determine the hatchery harvest rate, interception rate for wild fish, and catch per unit effort (CPUE). Chinook and coho fisheries in major tributaries including the Grays, Elochoman, Cowlitz, Toutle, Kalama, Lewis, Washougal, Wind, and Little White Salmon Rivers are sampled to collect CWT, CPUE, and interception rate for wild fish.

To evaluate hatchery programs comprehensive monitoring and evaluation programs are needed. These programs at a minimum must measure adult hatchery and wild escapement, and fishery contributions from hatchery and wild salmonids for every stock. Reproductive success should be measured for representative wild and hatchery stocks. Ecological interactions (predation, competition, and disease) need to be measured for representative stocks as well. See section 1.10.

### **11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.**

Chinook abundance data for streams will continue with PSMFC funding. Intermittent chum surveys will continue if outside funding secured. Baseline stream surveys should be continued for wild spawning. Staffing hours to conduct spawning grounds surveys and biological assessment is limited by funding. Funding and resources are currently committed to monitor and evaluate this program as detailed in the Lower Columbia River FMEP (2002).

### **11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.**

Spawning ground surveys and biological sampling occurring during the recovery will employ measures to ensure that effects on the survival of the listed chinook salmon population are insignificant. Salmon redds and live spawning fish will not be disturbed during surveys and sampling.

## **Section 12. Research**

### **12.1 Objective or purpose.**

No research is ongoing for this program.

### **12.2 Cooperating and funding agencies.**

### **12.3 Principle investigator or project supervisor and staff.**

### **12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.**

### **12.5 Techniques: include capture methods, drugs, samples collected, tags applied.**

### **12.6 Dates or time periods in which research activity occurs.**

### **12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.**

### **12.8 Expected type and effects of take and potential for injury or mortality.**

### **12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached “take table” (Table 1).**

### **12.10 Alternative methods to achieve project objects.**

### **12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.**

### **12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.**

## Section 13. Attachments and Citations

### 13.1 Attachments and Citations

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## **Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY**

### **14.1 Certification Language and Signature of Responsible Party**

“I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.”

**Name, Title, and Signature of Applicant:**

Certified by\_\_\_\_\_ Date:\_\_\_\_\_

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

*Spring Chinook*

ESU/Population	Lower Columbia River Spring Chinook
Activity	Kalama River Spring Chinook
Location of hatchery activity	Kalama Falls Hatchery
Dates of activity	May-September
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya		nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	300*	nya
Removal (e.g., broodstock (e)	nya	nya	300	nya
Intentional lethal take (f)	nya	nya	Unk	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

\* Take level if proposed listing of hatchery population is enacted.

- Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- Take associated with weir or trapping operations where listed fish are captured and transported for release.
- Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
- Listed fish removed from the wild and collected for use as broodstock.
- Intentional mortality of listed fish, usually as a result of spawning as broodstock.
- Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
- Other takes not identified above as a category.

Take Table 2. Estimated listed salmonid take levels by hatchery activity.

*Fall Chinook*

ESU/Population	Lower Columbia River Fall Chinook
Activity	Kalama River Spring Chinook
Location of hatchery activity	Kalama Falls Hatchery
Dates of activity	May-September
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

0\* Spring Chinook pass upstream before the Modrow Bridge wier is placed in August.

- Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- Take associated with weir or trapping operations where listed fish are captured and transported for release.
- Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
- Listed fish removed from the wild and collected for use as broodstock.
- Intentional mortality of listed fish, usually as a result of spawning as broodstock.
- Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
- Other takes not identified above as a category.

Take Table 3. Estimated listed salmonid take levels by hatchery activity.

*Summer Steelhead*

ESU/Population	Lower Columbia River Summer Steelhead
Activity	Kalama River Spring Chinook
Location of hatchery activity	Kalama Falls Hatchery
Dates of activity	May-September
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock) (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

0\* Chinook are separated from the sorting pond and listed steelhead are passed upstream of Kalama Falls.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category

Take Table 4. Estimated listed salmonid take levels by hatchery activity.

*Winter Steelhead*

ESU/Population	Lower Columbia River Winter Steelhead			
Activity	Kalama River Spring Chinook			
Location of hatchery activity	Kalama Falls Hatchery			
Dates of activity	May-September			
Hatchery Program Operator	WDFW			
Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

- a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
- c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
- e. Listed fish removed from the wild and collected for use as broodstock.
- f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
- g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
- h. Other takes not identified above as a category

Take Table 5. Estimated listed salmonid take levels by hatchery activity.

*Coho*

ESU/Population	Lower Columbia River Coho
Activity	Kalama River Spring Chinook
Location of hatchery activity	Kalama Falls Hatchery
Dates of activity	May-September
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

0\* Spring Chinook have been collected before the coho run has materialized.

- Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- Take associated with weir or trapping operations where listed fish are captured and transported for release.
- Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
- Listed fish removed from the wild and collected for use as broodstock.
- Intentional mortality of listed fish, usually as a result of spawning as broodstock.
- Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
- Other takes not identified above as a category.